Abstract

An embodiment of a method of determining bounds for a minimum cost begins by solving an integer program using a relaxation of binary variables to

5   determine a lower bound for the minimum cost. The integer program comprises a performance constraint and an objective of minimizing a cost. The binary variables which have values between zero and one comprise a subset. The method rounds up a first binary variable within the subset having a lowest ratio of a cost penalty to a performance reward. The method then rounds down one or more of the binary

10   variables within the subset until no binary variables within the subset may be rounded down without violating the performance constraint. The method iteratively rounds up one of the binary variables within the subset and then rounds down others until no binary variables remain in the subset. The method concludes with determining an upper bound for the minimum cost according to the binary variables having binary

15   values.